PATENT CLAIMS We hereby claim and desire to secure by Letters Patent the following.

1. Tooth system (1) intended for a tool (2) of an earth moving machine (3), which tooth system (1) is of the type comprising a holder (4) attached to the tool (2) and a front tooth portion (5), which is detachably arranged in relation to and on the holder (4) and is in the form of an exchangeable wear and/or replacement part intended for the actual earth moving (W), which tooth portion (5) comprises a rear leg (13) and the holder (4) comprises a cavity (14) designed to receive the leg (13) during interaction with the tooth portion (5) and, thus, achieve a common joint (A, B, C, D) for the absorption of arising forces (F_s, F_c, F_p) through a predetermined connection geometry comprising special, opposed, mutually interacting contact surfaces (15) and, at least initially, clearance surfaces (16) that are arranged along the tooth portion (5) and holder (4), **wherein** the tooth leg (13) and cavity (14), along at least a front part (C) of said joint (A, B, C, D) have a multi-armed, preferably cruciform, cross section (T1) comprising projection arms (31, 32, 33, 34), and grooves (24, 28 , 29, 30) each interacting with a projection arm (31, 32, 33, 34) and that a tensioning device (41) is arranged at the cavity's (14) rear part (19) for achieving a tightening and adjustable pretensioning of the tooth portion (5) in relation to the holder (4) essentially axially along the cavity's (14) longitudinal symmetry axis Y.

2. Tooth system (1) in accordance with claim 1, **wherein** the projection arms (31, 32, 33, 34) comprise at least one essentially vertically arranged arm (31) or heel (34) and two, theretoward essentially lateral, wing portions (32, 33).

3. Tooth system (1) in accordance with claim 1, **wherein** the projection arms (31, 32, 33, 34) comprise an, essentially vertically arranged, upper arm (31), a, essentially vertically arranged, lower heel (34) and two, essentially horizontally lateral wing portions (32, 33).

4. Tooth system (1) in accordance with claims 1, 2 or 3 **wherein** the tooth leg (13) has a rearwards convergent cross section (T2).

5. Tooth system (1) in accordance with 4, **wherein** the cavity (14) is designed as a notch (14) inwardly convergent of the holder (4).

6. Tooth system (1) in accordance with any one of the preceding claims **wherein** the cavity (14) is comprised by a rearwards (19) and upwards (24) along the top side of the holder (4) open notch (14).

7. Tooth system (1) in accordance with any one of the preceding claims, **wherein** the cavity's (14) rear part (19) is comprised of lengthwise side walls (22) and a bottom (23) that is essentially perpendicularly arranged to each other with the cavity (14) open upwards and to the rear, so that the cross section of this part (19) is essentially U-shaped.

8. Tooth system (1) in accordance with any one of the preceding claims, **wherein** a cross section (T2) within a middle part (20) of the cavity (14) comprises a truncated, lower triangular part with essentially rounded corners (22), where the blunt, lower side forms the cavity's (14) bottom (23) and where the cross section's (T2) lower corners (22) preferably comprise lengthwise clearance surfaces (16), while the cross section's (T2) upward continuation is primarily formed, by inwardly angled lengthwise sides (25), intended to form interacting contact zones (15) together with the tooth leg's (13) side surfaces (D1, D2) and thereafter by lengthwise, essentially vertical, side walls (26) at a certain distance from one another forming an upwardly open, upper notch neck (24).

9. Tooth system (1) in accordance with any one of the preceding claims, **wherein** the grooves (24, 28, 29, 30) within a front part (21) of the cavity (14) each comprise an outwardly dilating of the notch cross section (T1) from within the cavity (14) and forward in relation to the axial symmetry axis Y.

10. Tooth system (1) in accordance with any one of the preceding claims, **wherein** a middle part (20) of the cavity (14) has a play (16) arranged in part between the tooth leg's (13) lower sides (H1, H2) and the cavity's (14) lengthwise sides (22) at the cavity's bottom (23), and in part between the tooth portion's (5) spine part's (37) sides (39) and the cavity's (24) lengthwise upper sides (26) and between the tooth leg (13) underside (E1, E2) and the cavity's (14) bottom (23).

11. Tooth system (1) in accordance with any one of the preceding claims in combination with claim 6, **wherein** the tooth portion (5) comprises a spine part (37) protruding through the open notch (24).

12. Tooth system (1) in accordance with claim 11, **wherein** a secondary material reinforcement (36) is arranged at the tooth portion's (5) spine part (37).

13. Tooth system (1) in accordance with claim 1, **wherein** along a rear part (D) of the joint (A, B, C, D) between the connection parts (4, 5) are contact surfaces (15) arranged in an acutely pointed angle δ, that is, less than 10°, to the lengthwise symmetry axis Y or parallel thereto.

14. Tooth system (1) in accordance with any one of the preceding claims, **wherein** the tooth portion (5) or the holder (4) comprises a protruding torque heel (34) and that the opposed connection part (4 or 5) comprises a corresponding depression (30), interacting with the heel (34) to absorb the laterally impacting transverse forces (F_p), which impact perpendicular to the axial symmetry axis Y.

15. Tooth system (1) in accordance with any one of the preceding claims, **wherein** the projection arms (31, 32, 33, 34) are comprised by one, essentially somewhat forwardly inclined and upward symmetrically arranged, tooth point (31), and the two, essentially horizontal, lateral wing portions (32, 33) symmetrical on either side of the tooth point (31) and an essentially downward vertically designed heel (34).

16. Tooth system (1) in accordance with any one of the preceding claims, **wherein,** after the assembly of the holder (4) and the tooth portion (5), an impact zone (A, B) at the beginning of the joint (C) between them, forms a common stop zone, whose stop surfaces (15) comprise the front side (A) of the holder (4) and the opposed back side (B) of the tooth portion (5), where the greater part of the tooth portion's (5) surfaces (B) that is in contact with the front side (A) of the holder (4), are situated on the same side as the holder (4) of an imagined vertical plane (XZ) positioned directly in front of the forwardmost parts of the holder (4).

17. Tooth system (1) in accordance with any one of the preceding claims, **wherein** the essentially greater part of the loads (F_s, F_c, F_p) and the torques resultant therefrom are absorbed through contact surfaces (15) primarily at the forward part of the joint (C).

18. Tooth system (1) in accordance with any of claims 2 to 17, **wherein** contact zones for winch force (F_s) absorption, as well as that of torques resultant

therefrom, are arranged along lower contact surfaces (F1 and F2) at the tooth portion's (5) two lateral wing portions (32, 33) and upper contact surfaces (D1 and D2) at the top side of the tooth leg (13).

19. Tooth system (1) in accordance with any of claims 2 to 18, **wherein** contact zones for shearing force (F_c) absorption, as well as that of torques resultant therefrom, are arranged along upper contact surfaces (B1 and B2) at the tooth portion's (5) two lateral wing portions (32, 33) and lower contact surfaces (E1 and E2) at the lower side of the tooth leg (13).

20. Tooth system (1) in accordance with any of claims 2 to 19, **wherein** contact zones for transverse force (F_p) absorption, as well as that of torques resultant therefrom, depending on a given force's (F_p) direction of impact, are arranged along at least an essentially vertical, lengthwise contact surface (G2) at the torque heel (34), at least one upper, inclined, lengthwise contact surface (D1) at the top side of the tooth leg (13), at least one lower, essentially horizontal, lateral contact surface (F2) at one of the tooth portion's (5) lateral wing portions (33), at least one upper, inclined contact surface (B1) at the tooth portion's (5) other lateral wing portion (32) and at least one upper, essentially horizontal, lateral contact surface (C1) at the tooth portion's other lateral wing portion (32); or, for a force (F_p) from the opposite direction, essentially through the corresponding contact surfaces (G1, D2, F1, B2 and C2).

21. Tooth system (1) in accordance with any one of claims 2 to 20, **wherein** the transverse (F_p) and shearing (F_c) and normal forces (F_s) leverage ratio in relation to the axial symmetry axis Y and a fulcrum point, preferably the heel (34), around which the torsion occurs in the joint between the connection parts (4, 5) where the tooth portion's (5) protruding length along the axial symmetry axis Y from said fulcrum defines the first lever arm (b) and where the length along the axial symmetry axis Y of the tooth leg (13) inserted in the holder (4) from said fulcrum defines the second level arm (r), is less than one, that is $(b)/(r) < 1$.

22. Tooth system (1) in accordance with any one of the preceding claims, **wherein** the removably attachable fastening device (41) at the back side (17) of the holder (4) comprises a fitting device (42), which is designed to fit the cavity's (14) open rear part (19) and against the tooth leg's (13) end surface (52), a threaded (55) bolt (53), which is arranged through the fitting device (42), with a forward claw

or hook (54) for interaction with a recess or a hook device (61) arranged at the tooth portion (5), and a rear pretensioning and locking device (56) comprising an elastic body (60) and a locking mechanism (59) for achieving a dynamic fixity and a reliable positioning at a predetermined position by the replaceable tooth portion (5) at the holder (4) through the multi-armed form and the adjustable pretensioning force.

23. Tooth system (1) in accordance with any one of the preceding claims, **wherein** the tooth system (1) comprises a removable insert, suitably of hard metal, at the rear part (D) of the joint (A, B, C, D) within the cavity (14), which insert absorbs surface forces between the interacting connection parts (4, 5).

24. Tooth system (1) in accordance with any one of the preceding claims, **wherein** the earth moving machine (3), the tool (2) and the wear and/or replacement parts (5) for the removal and breaking of masses from a working surface (W), are especially exemplified by a dredger cutter's (3) bore bit (2) with its replaceable wear teeth (5).